STATE HEALTH REGISTRY OF IOWA

2015

Cancer in Iowa

The University of Iowa
College of Public Health

In 2015, an estimated 6,400 Iowans will die from cancer, 18 times the number caused by auto fatalities. Cancer and heart disease are the leading causes of death in Iowa. These projections are based upon mortality data the State Health Registry of Iowa receives from the Iowa Department of Public Health. The Registry has been recording the occurrence of cancer in Iowa since 1973, and is one of fourteen population-based registries and three supplementary registries nationwide providing data to the National Cancer Institute. With *2015 Cancer in Iowa* the Registry makes a general report to the public on the status of cancer. This report will focus on:

- a description of the Registry and its goals;
- cancer estimates for 2015;
- a special section on skin melanoma;
- brief summaries of recent/ongoing research projects;
- a selected list of publications from 2014.

The State Health Registry of Iowa

The State Health Registry of Iowa is the best statewide resource for determining the burden of cancer on the Iowa population and assessing trends in the occurrence of cancer over time.

Cancer is a reportable disease as stated in the Iowa Administrative Code. Cancer data are collected by the State Health Registry of Iowa, located at The University of Iowa in the College of Public Health's Department of Epidemiology. The staff includes more than 50 people. Half of them, situated throughout the state, regularly visit hospitals, clinics, and medical laboratories in Iowa and neighboring states to collect cancer data. A follow-up program tracks more than 99 percent of the cancer survivors diagnosed since 1973. This program provides regular updates for follow-up and survival. The Registry maintains the confidentiality of the patients, physicians, and hospitals providing data.

In 2015 data will be collected on an estimated 16,900 new cancers among Iowa residents. In situ cases of bladder cancer are included in the estimates for bladder cancer, to be in agreement with the definition of reportable cases of the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute.

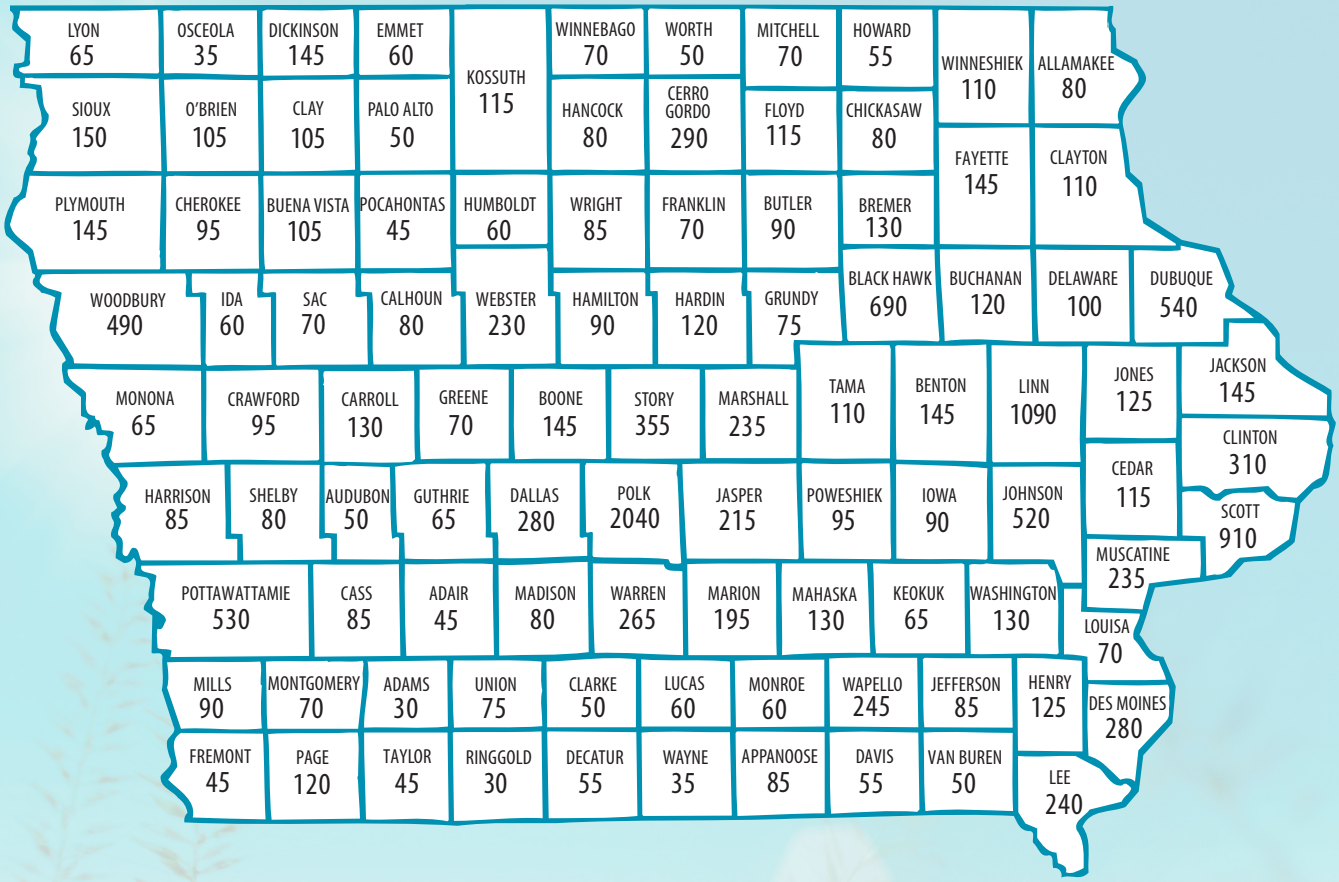
Since 1973 the Iowa Registry has been funded by the SEER Program of the National Cancer Institute. Iowa represents rural and Midwestern populations and provides data included in many National Cancer Institute publications. Beginning in 1990 about 5-10 percent of the Registry's annual operating budget has been provided by the state of Iowa. Beginning in 2003, the University of Iowa has also been providing cost-sharing funds. The Registry also receives funding through grants and contracts with university, state, and national researchers investigating cancer-related topics.

THE GOALS OF THE REGISTRY ARE TO:

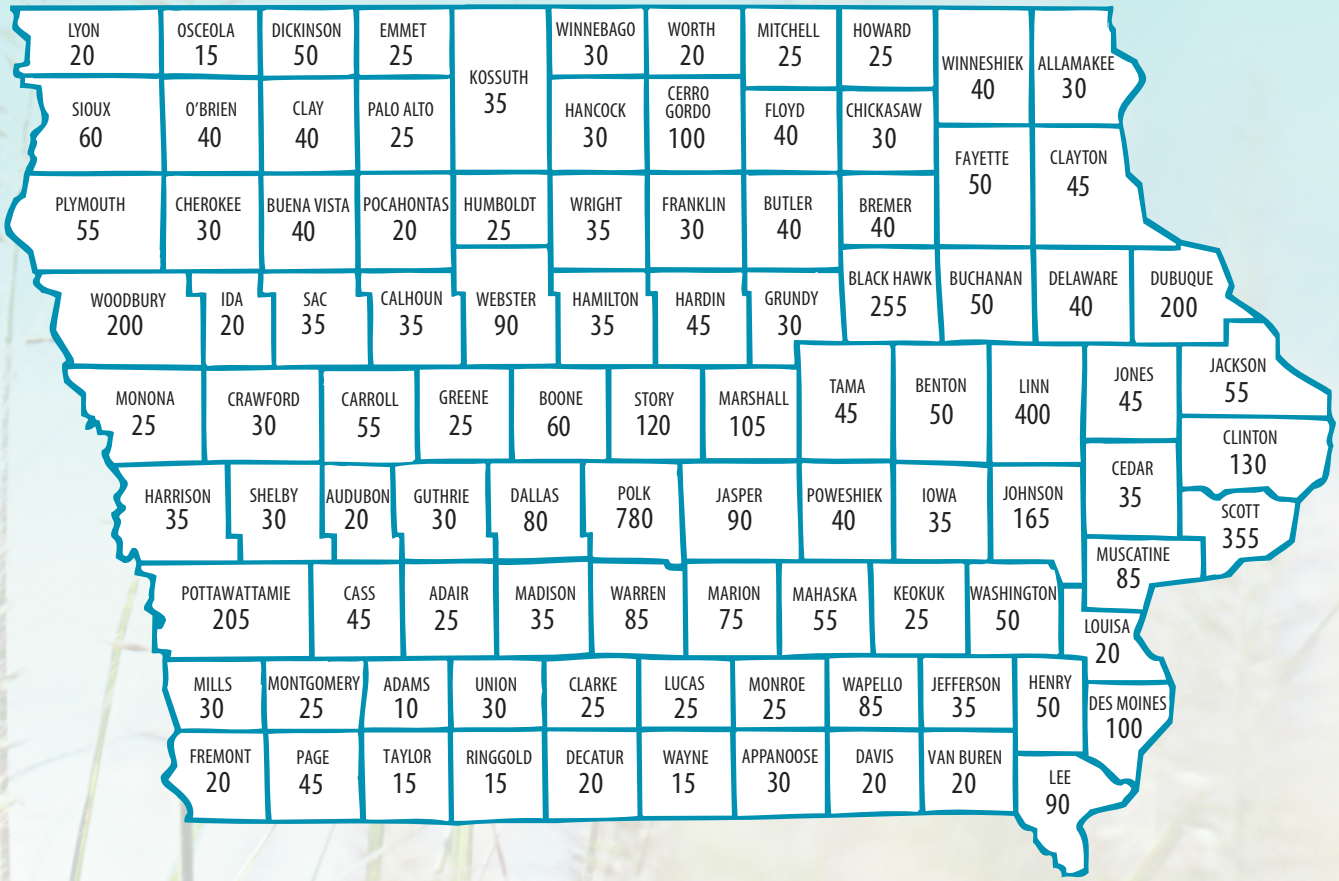
* **assemble and report measurements of cancer incidence, survival, and mortality among Iowans;**
* **provide information on changes over time in the extent of disease at diagnosis, therapy, and patient survival;**
* **promote and conduct studies designed to identify factors relating to cancer etiology, prevention, and control;**
* **respond to requests from individuals and organizations in the state of Iowa for cancer data and analyses;**
* **provide data and expertise for cancer research activities and educational opportunities.**

Cancer Projections for 2015

PROJECTED NUMBER OF NEW CANCERS IN IOWA FOR 2015



PROJECTED NUMBER OF CANCER DEATHS IN IOWA FOR 2015



Top 10 Types of Cancer in Iowa Estimated for 2015

NEW CANCERS IN FEMALES

Type	# of Cancers	% of Total
Breast	2250	26.8
Lung	1000	11.9
Colon & Rectum	790	9.4
Uterus	610	7.3
Skin Melanoma	380	4.5
Non-Hodgkin Lymphoma	350	4.2
Thyroid	300	3.6
Leukemia	250	3.0
Kidney & Renal Pelvis	230	2.7
Pancreas	230	2.7
All Others	2010	23.9
Total	**8400**	

CANCER DEATHS IN FEMALES

Type	# of Cancers	% of Total
Lung	760	25.3
Breast	390	13.0
Colon & Rectum	290	9.7
Pancreas	200	6.6
Ovary	150	5.0
Leukemia	120	4.0
Non-Hodgkin Lymphoma	110	3.7
Uterus	110	3.7
Brain	70	2.3
Kidney & Renal Pelvis	60	2.0
All Others	740	24.7
Total	**3000**	

NEW CANCERS IN MALES

Type	# of Cancers	% of Total
Prostate	1700	20.0
Lung	1270	15.0
Colon & Rectum	840	9.9
Bladder (invasive and noninvasive)	640	7.5
Skin Melanoma	460	5.4
Non-Hodgkin Lymphoma	420	4.9
Kidney & Renal Pelvis	400	4.7
Leukemia	330	3.9
Oral Cavity	280	3.3
Pancreas	240	2.8
All Others	1920	22.6
Total	**8500**	

CANCER DEATHS IN MALES

Type	# of Cancers	% of Total
Lung	970	28.6
Prostate	320	9.4
Colon & Rectum	300	8.8
Pancreas	210	6.2
Leukemia	160	4.7
Non-Hodgkin Lymphoma	140	4.1
Esophagus	130	3.8
Bladder	130	3.8
Kidney & Renal Pelvis	130	3.8
Brain	110	3.2
All Others	800	23.6
Total	**3400**	

Fortunately for Iowans, the chances of being diagnosed with many types of cancer can be reduced through positive health practices such as smoking cessation, physical exercise, healthful dietary habits, and alcohol consumption in moderation. Early detection through self-examination and regular health checkups can improve cancer survival.

Skin Melanoma in Iowa

Skin melanoma is the 5th most commonly diagnosed cancer in both males and females in Iowa. Melanomas occur in other locations throughout the body, but the skin is by far the most common site. Therefore, throughout this section, the term melanoma will be used to refer to skin melanoma. The age-adjusted rates of melanoma have increased dramatically for both in situ (confined to the top layers of the skin known as the epidermis) and invasive (invasion into deeper layers of the skin known as the dermis, subcutis, and potentially other surrounding tissues) melanoma. The annual age-adjusted incidence of invasive melanoma has quadrupled from 6.5 cases per 100,000 population in 1974-1976, to 24.5 cases per 100,000 population in 2010-2012 **(Figure 1)**. Likewise, the incidence of in situ melanoma has increased from almost no cases in 1974-1976 to 13.7 cases per 100,000 population in 2010-2012. Several factors have likely contributed to the increase, including increased exposure to ultraviolet (UV) light, heightened public awareness, and changes in reporting terminology among pathologists.

Greater surveillance by health care providers may also be associated with the increased proportion of in situ melanomas relative to invasive melanomas. During the period 1973-1982, very few in situ melanomas were diagnosed, but by the period of 2003-2012, in situ melanomas made up approximately one-third of all cases **(Figure 2)**. Localized invasive melanomas (spread beneath top layer of skin, but not to lymph nodes or nearby tissues) make up over half of all melanoma cases, with regional (spread to nearby lymph nodes or tissues) and distant stages (spread to lymph nodes or organs far away from the original growth) each making up less than 10% of all melanomas.

While melanoma rates are highest among older adults, it is the 3rd most common cancer in adolescents and young adults. The age-adjusted rate of melanoma in those less than 40 years of age has more than doubled between 1973 and 2012, with a current rate of 8.5 per 100,000 population **(Figure 3)**. Adults ages 40-59 and 60 and older have experienced even sharper increases in the rates of melanoma. In Iowa, as with the

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Figure 1. In situ and invasive melanoma incidence rates and melanoma mortality rates, Iowa, 1974–2012.

(Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population)

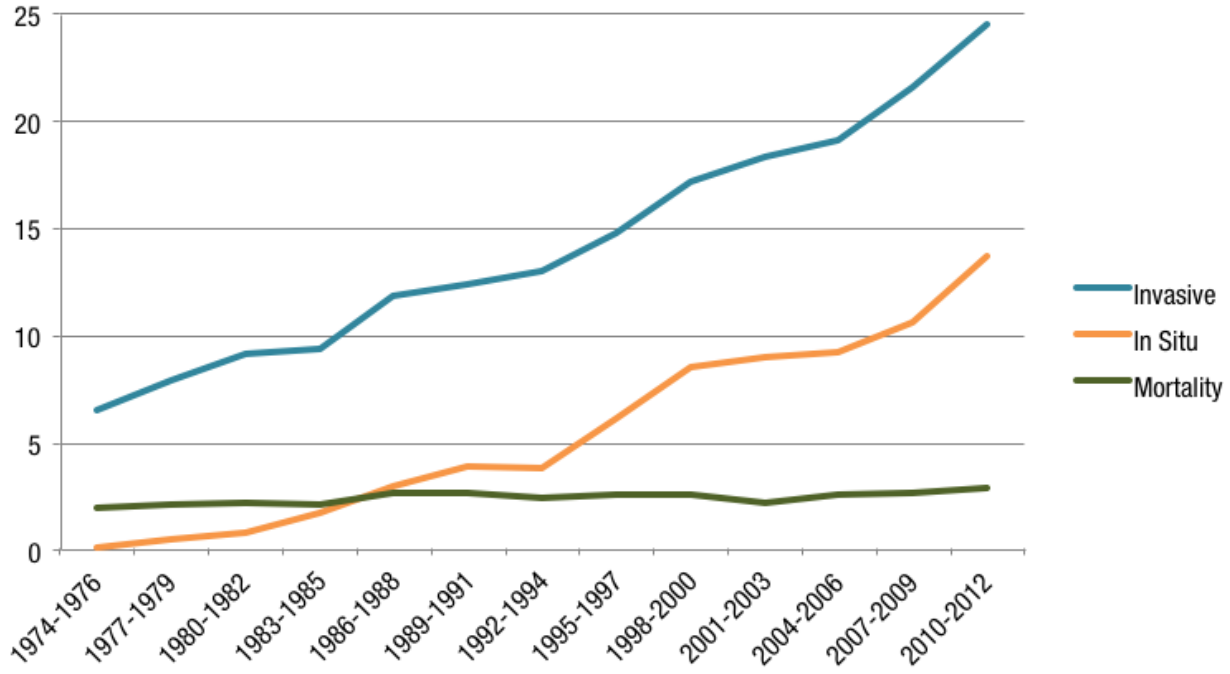


Figure 2. **Frequency distribution of melanoma by stage, Iowa, 1973-2012.**

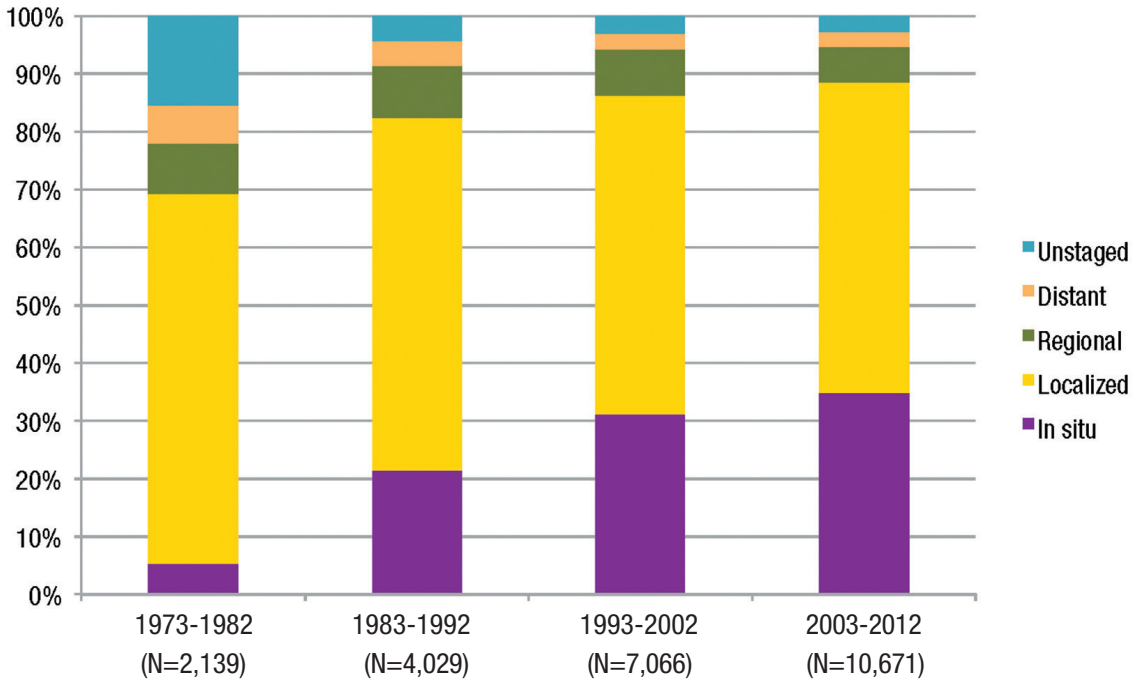
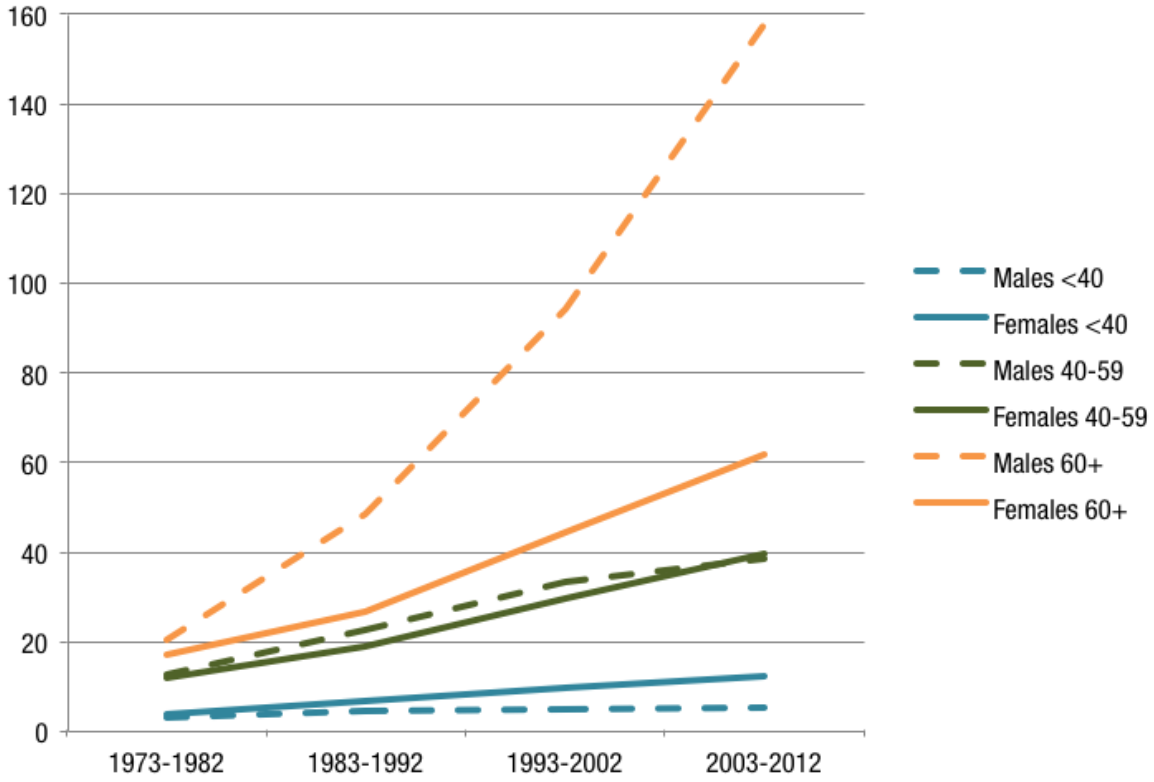


Figure 3. **Combined in situ and invasive melanoma incidence rates by age and gender, Iowa, 1973-2012.**
(Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population).



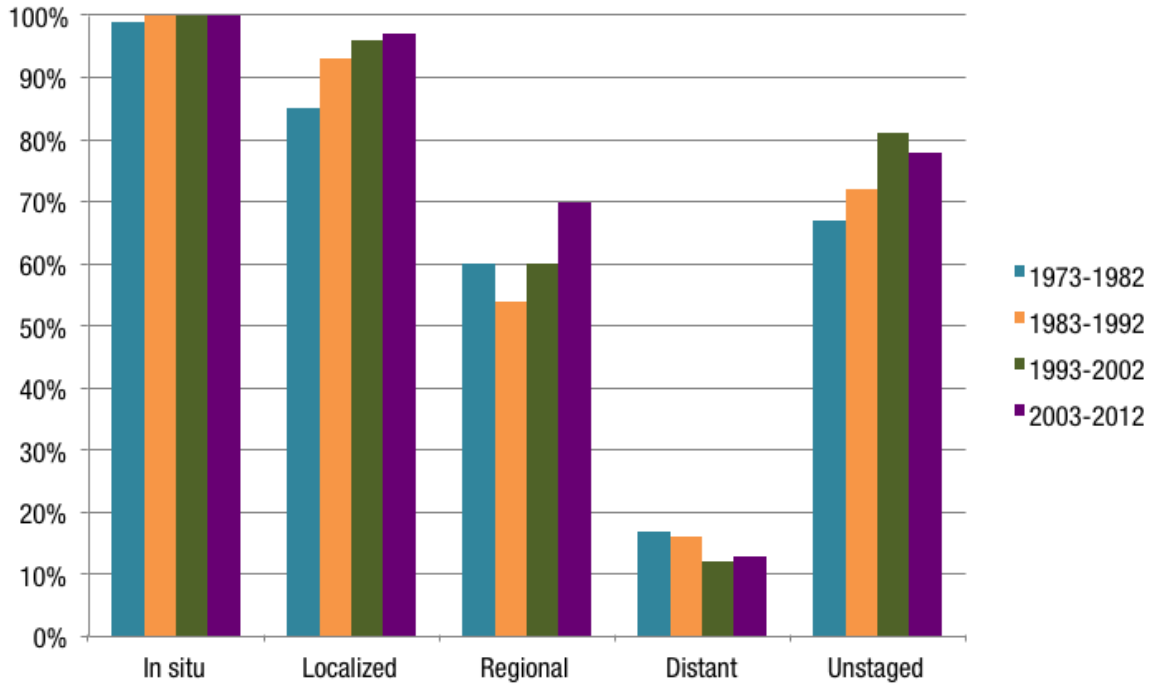
United States in general, men have a higher rate of melanoma than women overall, but this varies by age. Among those less than age 40, the rate of melanoma is higher for women; among those 60 years of age or older, the rate is much higher for men.

Melanoma begins in melanocytes (pigment producing cells in the epidermis), and can occur on any skin surface. In Iowa cases from 1973-2012, melanoma most often occured on the head or neck (30%), followed by the trunk (27%), upper limbs (23%), and lower limbs (17%). For those diagnosed under the age of 60, the trunk has been the more common site of melanoma among men, whereas the legs have been the more common site among women. For those diagnosed age 60 and older, the head or neck has been the most common site in both sexes.

Overall, mortality rates for melanoma have been increasing, and melanoma has been the underlying cause of death for 2,881 Iowans between 1973 and 2012 **(Figure 1)**. Five-year relative survival for in situ melanoma is 100%. Survival for localized and regional melanomas has increased from lows of 85% and 54% to 97% and 70%, respectively **(Figure 4)**. Survival for distant melanoma, however, has not improved over time, and remains at approximately 13%. These differences in survival by stage highlight the importance of early detection of melanoma.

As much as 90% of melanoma is estimated to be caused by UV exposure. People who have had one or more severe, blistering sunburns are at increased risk of melanoma. A 2004 study by the Environmental Protection Agency found that 44% of white adults in Iowa had at least one sunburn in the past year. The total amount of sun exposure over a lifetime is also a risk factor. In addition, studies have consistently shown that use of artificial sources of UV radiation, such as sunlamps and tanning booths, increases the risk of developing melanoma. The more a person uses indoor tanning booths, the greater the risk, and using tanning booths prior to age 35 increases the risk of melanoma by 59%. According to the 2010 National Health Interview Survey, nearly one in five women ages 18-29 reported having used a sunlamp, sunbed or tanning booth at least once in the 12 months preceding the survey, with Midwesterners reporting the greatest use of any region in the U.S. Specifically among non-Hispanic white women ages 18-25, 30% reported using indoor tanning.

Figure 4. Relative 5-year survival for melanoma by stage, Iowa, 1973-2012.



Having pale skin that burns easily, blue or gray eyes, red or blond hair, or many freckles increases the risk of melanoma. Melanoma can also sometimes run in families. Having two or more close relatives with melanoma (mother, father, sister, brother or child) can increase the risk of melanoma. Around 10% of all people with melanoma have a family history of the disease. Survivors of melanoma are nine times more likely than the general population to develop a new melanoma; approximately 5% of people who have had a melanoma in the past will eventually develop a second melanoma. In addition, people who have had other types of very common and much less aggressive skin cancers (basal cell or squamous cell) have double the risk of developing additional basal cell or squamous cell cancers, or melanoma.

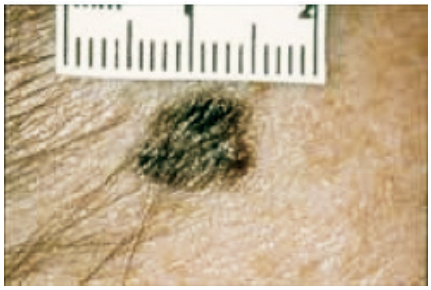
A nevus (mole) is a benign (noncancerous) tumor. Common moles are usually smaller than 6 mm (one quarter inch), with an even color, a round or oval shape, and a smooth surface. Although the majority of melanomas do not arise from a pre-existing nevus or mole, a dysplastic nevus may in some cases turn into cancer. A dysplastic nevus is generally bigger than a common mole and its color, surface and border may be different. It can have a mixture of different colors ranging from pink to dark brown, and is usually flat with a smooth, slightly scaly or pebbly surface with an irregular edge that may fade into the surrounding skin. Having more than 50 common moles also increases the risk for melanoma.

Most moles, even dysplastic nevi, do not change into melanoma. But there are important signs to watch for, which are often referred to as "ABCDE": Asymmetry (both asymmetry of shape and internal asymmetry of color), Border that is irregular, Color that is uneven, Diameter (size greater than a pencil eraser (6 mm)), and Evolving (the mole has changed over the past few weeks or months). **Figure 5** shows an example of an asymmetric melanoma with irregular borders and a length of 10 mm.

Treatment for melanoma depends on the stage of disease, the size and location of the tumor, and the general health of the person. In most cases, the goal of treatment is to remove or destroy the cancer completely. As previously discussed, most skin cancers can be cured if found and treated early. Surgery is the usual treatment, but more advanced stages of melanoma may also involve chemotherapy, immunotherapy (medicines that stimulate a patient's own immune system to recognize and destroy cancer cells) or radiation therapy.

There are steps that people can take to help prevent the 90% of melanomas caused by UV exposure, including the following: stay in the shade, especially during midday hours (10 AM to 4 PM), wear clothing that covers up arms and legs, wear a hat with a wide brim to shade the face, head, ears and neck, wear sunglasses with UV protection, use sunscreen with sun protection factor (SPF) 30 or higher that is broad spectrum (protects against UVA and UVB rays) and is water

Figure 5. Asymmetric melanoma with irregular borders.



resistant, and avoid indoor tanning. Of note, Iowa is one of only nine states that do not have laws or regulations related to indoor tanning, other than minimum requirements for operation of tanning facilities. Most other states have implemented bans on indoor tanning for minors under a certain age, laws requiring parental accompaniment or parental permission, or harm-reduction regulations for all ages that require use of eye protection or limit exposure time.

There are also recommended approaches for early detection. Checking skin once per month can help detect new moles or changes in existing moles. Friends or family members can be helpful in checking the scalp and back. Regular skin exams by a health care professional qualified to diagnose skin cancer can also help detect melanoma early. Regular skin exams are particularly important for people with dysplastic nevi, a family history of melanoma, and those who have had melanoma in the past.

Research Projects During 2015

The State Health Registry of Iowa is participating in over 60 open studies approved by the University of Iowa Human Subjects Office during 2015. Brief descriptions of a few of these studies are provided.

AGRICULTURAL HEALTH STUDY

The Agricultural Health Study (AHS) is a long-term study of agricultural exposures (including pesticides) and chronic disease (especially cancer) among commercial or private pesticide applicators (and their spouses, if married) in Iowa and North Carolina. The study is funded through the National Cancer Institute and involves several federal agencies. We are in the 23rd year of the study.

In the first five years, 89,658 subjects (58,564 in Iowa and 31,094 in North Carolina) were enrolled in the study. The total for Iowa included 31,877 private applicators, 21,771 spouses of private applicators, and 4,916 commercial applicators. Enrollment consisted of completing questionnaires about past exposures and health. The second phase of the study for private applicators and their spouses was completed at the end of 2003. It involved a telephone interview, a mailed dietary questionnaire, and collection of a cheek cell sample from all consenting cohort members. The telephone interview asked about pesticide use since enrollment, current farming and work practices, and health changes. The dietary health questionnaire asked about cooking practices and types of foods eaten, since cooking practices and diet may play a role in cancer and other health conditions. The cheek cells are being used to understand possible links between genetics, exposures, and disease. For commercial applicators, the second phase of the study was completed at the end of 2005. The study's third phase began in 2005 and ended in 2010. It involved updating information about exposures and health. The fourth phase of the study began in the fall of 2011 and for the University of Iowa research team primarily involves collection of blood and urine samples from a select subgroup of AHS male participants and collection of cheek cells from AHS participants diagnosed with cancer.

Since 1997, cohort members have been linked annually or biennially to mortality and cancer registry incidence databases in both states. In addition, mortality data on the cohort are being obtained from the National Death Index. More information about results from this study, the study background, frequently asked questions, other resources (internet & telephone) for agricultural health information, references for publications to date, and information for scientific collaborators can be found at the website, http://aghealth.nci.nih.gov/. This study's data have also been pooled with data from other cohort studies and analyzed as collaborative activities. The titles for over 200 publications from this study linked to PubMed are available at the website. The cancer-related references for 2014 publications are provided in the last section of this report.

AYA HOPE STUDY

The Adolescent and Young Adult (AYA) Health Outcomes and Patient Experience (HOPE) Study is another ongoing example of a cancer survivor study. This study is an initial step in addressing potential factors related to gaps in research, care, and outcomes. From 7 SEER Registries across the United States, 525 patients (40 in Iowa), 15-39 years old at diagnosis between July 1, 2007 and October 31, 2008 have been enrolled with any of the following cancers: ovarian or testicular cancer, Hodgkin lymphoma, non-Hodgkin lymphoma, acute lymphoblastic leukemia, or selected types of sarcoma. Those who responded were representative of all AYA cancer survivors during this time period. 91% of the 525 have completed a subsequent survey 8 to 17 months after the initial survey to obtain additional follow-up information regarding their cancer survivorship experience. During 2014, publications that have reported findings from this study are provided in the last section of this report.

IOWA WOMEN'S HEALTH STUDY

This is a population-based cohort of 41,837 Iowa women, aged 55-69, who were recruited in 1986 to determine whether diet, body fat distribution, and other risk factors are related to cancer incidence. Exposure and lifestyle information was collected in a baseline mailed survey and in several follow-up mailed surveys. Mortality and cancer incidence have been ascertained since 1986 through annual linkage to the State Health Registry of Iowa

databases and the National Death Index. In 2010 the study was refunded for its 25th through 29th years. Renewed funding is currently being sought. Over time, this has led to over 250 cancer-related publications, some of which occurred in 2014 and are listed in the references provided in the last section of this report.

LUNG CANCER CARE OUTCOMES/SURVEILLANCE CONSORTIUM

This study involves a statistical coordinating center, the State Health Registry of Iowa, and five other primary data collection and research sites around the United States. Across these sites, we conducted population-based research in the areas of access to care and patterns of care for lung and colorectal cancer. In Iowa, this study was limited to lung cancer patients. We are evaluating the reasons for particular care decisions by patients and their physicians, including variation in disseminations of modern care protocols and practices in different geographic areas. We are also evaluating the effects of these decisions and practices on patient outcomes, including quality of life. Over 1,000 newly diagnosed lung cancer patients were enrolled between June 2003 and March 2005. Thereafter, these patients provided consent for medical record abstraction and participated in follow-up interviews. Several publications have resulted from the findings and those that occurred in 2014 are provided in the last section of this report.

NON-HODGKIN LYMPHOMA (NHL) CASE-CONTROL STUDY

The State Health Registry of Iowa (SHRI) with other investigators at the Mayo Clinic participated in a collaborative, population-based case-control study of NHL involving researchers at the National Cancer Institute and three other Surveillance, Epidemiology, and End Results (SEER) registries. The main objective of the study was to better characterize risk factors for NHL. In Iowa, 364 live patients newly diagnosed with NHL between July 1, 1998 and June 30, 2000 were enrolled. A similar number of population controls participated. Blood samples were sought from study participants. The SHRI also coordinated the acquisition of pathology reports, slides, and tissue blocks from all SEER centers. The slides were reviewed to determine the reliability of NHL pathologic classification. More recently, we collaborated with researchers to investigate whether genes with functional, common variant polymorphisms involved in immune function and regulation are associated with overall survival from NHL among these patients. To achieve this aim, medical record reviews were performed to obtain more detailed information on the treatment received for NHL. This study's data have also been pooled with data from other NHL case-control studies and analyzed as part of the InterLymph Consortium, a group of international investigators who discuss and undertake research activities with these data. All of these research activities resulted in several publications during 2014. The references for these are provided in the last section of this report.

SECOND CANCER STUDIES INCLUDING THE WECARE STUDY

Over the past three decades, the State Health Registry of Iowa has participated in several second cancer studies. These have consisted of cohorts with a first cancer of the cervix, ovary, testis, uterus, female breast, non-Hodgkin lymphoma, or Hodgkin disease. They have been conducted in collaboration with the Radiation Epidemiology Branch at the National Cancer Institute and other registries in North America and Europe. Generally these studies evaluate the treatment received for the first cancer and the risk it places on the patient for development of a second cancer. They typically involve medical record review and pathology material retrieval. Currently, we are evaluating esophagus, pancreas, and stomach as second cancer sites in several of these cohorts, mentioned above, with a first cancer.

The WECARE (Women's Environmental Cancer and Radiation Epidemiology) Study is another example of a second cancer study. This study is designed to examine gene carrier status, demographic and lifestyle factors as well as environmental and treatment factors reported to be associated with an initial breast cancer as they relate to the development of a second breast cancer in the opposite breast. Eligible cases were diagnosed with a first breast cancer between 1985 and 2009 that did not spread beyond the regional lymph nodes at diagnosis and a second primary contralateral breast cancer diagnosed at least one year after the first breast cancer diagnosis. Eligible controls were women with unilateral breast cancer who were individually matched to cases on year of birth, year of diagnosis, registry

region, and race. The controls must have survived without any subsequent diagnosis of cancer and with an intact contralateral breast during the interval that elapsed between their matched case's first and second breast cancer diagnoses. Data collection not only involved medical record review, but also participant interviews and biosample collection, either cheek cells or blood. The WECARE staff is collecting mammographic film data for its research subjects in 2014 to evaluate breast density as another risk factor for a subsequent diagnosis of invasive breast cancer in the contralateral breast. A listing of publications during 2014 from second cancer studies, including the WECARE Study, is provided in the last section of this report.

SEER-MEDICARE

In the early 1990s, the cancer incidence and survival data from the State Health Registry of Iowa was combined with other SEER Registry data and linked to Medicare data. This linked data set has been updated on several occasions since and has become an important data resource for cancer research involving epidemiologic and health services research related to the diagnosis and treatment procedures, costs, and survival of cancer patients. Over the years many publications have resulted from this linked data set including several during 2014, which are listed at http://healthservices.cancer.gov/seermedicare/overview/publications.html.

STUDIES INVOLVING TISSUE

Today, researchers are increasingly looking to obtain tissue to study molecular characteristics of cancers. Several studies that involve the State Health Registry of Iowa have included tissue. During 2014, several articles involving de-identified tissue from Iowans were published, the references for which are provided in the last section of this report.

TRANSPLANT CANCER MATCH STUDY

Solid organ transplantation provides life-saving treatment for end-stage organ disease, but is associated with substantially elevated cancer risk, largely due to the need to maintain long-term immunosuppression. Important questions remain concerning the role of immunosuppression and other factors in causing cancer in this setting. Staff at two federal agencies, the National Cancer Institute (NCI) and the Health Resources and Services Administration (HRSA), are creating a database through linkage of information during 1987-2009 or beyond on over 200,000 U.S. transplant recipients, wait list candidates (over 120,000 in addition to those who were subsequently transplanted), and donors (over 60,000 deceased donors, over 50,000 living donors) with information on cancer from 15 U.S. cancer registries, including the State Health Registry of Iowa. These data are being used to conduct research concerning the spectrum of cancer risk in transplant recipients. The data will also be used by HRSA in its public health role overseeing the U.S. solid organ transplant network to maintain and improve safety of organ transplantation, and will allow NCI to better characterize the burden of cancer in this population and discover additional factors associated with cancer among this population. Several publications have resulted from the findings and those that occurred in 2014 are provided in the last section of this report.

COOPERATIVE AGREEMENTS AND OTHER REGISTRIES

In the Midwest, the SHRI maintains cooperative agreements with several hospital cancer registries and other agencies/entities. Some of the latter include:

- Iowa Department of Public Health
- Iowa Cancer Consortium
- The University of Iowa
  - Center for Health Effects of Environmental Contamination
  - Center for Health Policy and Research
  - Center for Public Health Statistics
  - Environmental Health Sciences Research Center
  - Health Effectiveness Research Center
  - Holden Comprehensive Cancer Center
  - Iowa Center for Agricultural Safety and Health
  - Iowa Center for Education and Research on Therapeutics (Iowa CERT)
  - Injury Prevention Research Center
  - Nutrition Center
  - Prevention Research Center for Rural Health
  - Preventive Intervention Center
  - Reproductive Molecular Epidemiology Research & Education Program

Selected 2014 Publications

AGRICULTURAL HEALTH STUDY

Alavanja MC, Hofmann JN, Lynch CF, Hines CJ, Barry KH, Barker J, et al. Non-hodgkin lymphoma risk and insecticide, fungicide and fumigant use in the agricultural health study. PLoS One. 2014;9(10):e109332.

Black A, Gibson TM, Shiels MS, Park Y, Robien K, Albanes D, et al. Pooling prospective studies to investigate the etiology of second cancers. Cancer Epidemiology Biomarkers & Prevention. 2014;23(8):1598-608.

Gibson TM, Park Y, Robien K, Shiels MS, Black A, Sampson JN, et al. Body mass index and risk of second obesity-associated cancers after colorectal cancer: a pooled analysis of prospective cohort studies. Journal of Clinical Oncology. 2014;32(35):4004-11.

Kitahara CM, Flint AJ, Berrington de Gonzalez A, Bernstein L, Brotzman M, MacInnis RJ, et al. Association between class III obesity (BMI of 40-59 kg/m2) and mortality: a pooled analysis of 20 prospective studies. PLoS Med. 2014;11(7):e1001673.

Shiels MS, Gibson T, Sampson J, Albanes D, Andreotti G, Beane Freeman L, et al. Cigarette smoking prior to first cancer and risk of second smoking-associated cancers among survivors of bladder, kidney, head and neck, and stage I lung cancers. Journal of Clinical Oncology. 2014;32(35):3989-95.

Teras LR, Kitahara CM, Birmann BM, Hartge PA, Wang SS, Robien K, et al. Body size and multiple myeloma mortality: a pooled analysis of 20 prospective studies. British Journal of Haematology. 2014;166(5):667-76.

Wang Z, Zhu B, Zhang M, Parikh H, Jia J, Chung CC, et al. Imputation and subset-based association analysis across different cancer types identifies multiple independent risk loci in the TERT-CLPTM1L region on chromosome 5p15.33. Human Molecular Genetics. 2014;23(24):6616-33.

Wolpin BM, Rizzato C, Kraft P, Kooperberg C, Petersen GM, Wang Z, et al. Genome-wide association study identifies multiple susceptibility loci for pancreatic cancer. Nature Genetics. 2014;46(9):994-1000.

AYA HOPE STUDY

Keegan TH, Tao L, Derouen MC, Wu XC, Prasad P, Lynch CF, et al. Medical care in adolescents and young adult cancer survivors: what are the biggest access-related barriers? Journal of Cancer Survivorship. 2014;8(2):282-92.

Parsons HM, Schmidt S, Harlan LC, Kent EE, Lynch CF, Smith AW, et al. Young and uninsured: Insurance patterns of recently diagnosed adolescent and young adult cancer survivors in the AYA HOPE study. Cancer. 2014;120(15):2352-60.

Potosky AL, Harlan LC, Albritton K, Cress RD, Friedman DL, Hamilton AS, et al. Use of appropriate initial treatment among adolescents and young adults with cancer. Journal of the National Cancer Institute. 2014;106(11).

Zebrack B, Kent EE, Keegan TH, Kato I, Smith AW, Aya Hope Study Collaborative G. "Cancer Sucks," and Other Ponderings by Adolescent and Young Adult Cancer Survivors. Journal of Psychosocial Oncology. 2014;32(1):1-15.

IOWA WOMEN'S HEALTH STUDY

Jones RR, Yu CL, Nuckols JR, Cerhan JR, Airola M, Ross JA, et al. Farm residence and lymphohematopoietic cancers in the Iowa Women's Health Study. Environmental Research. 2014;133:353-61.

Leal AD, Thompson CA, Wang AH, Vierkant RA, Habermann TM, Ross JA, et al. Anthropometric, medical history and lifestyle risk factors for myeloproliferative neoplasms in the Iowa Women's Health Study cohort. International Journal of Cancer. 2014;134(7):1741-50.

Linabery AM, Prizment AE, Anderson KE, Cerhan JR, Poynter JN, Ross JA. Allergic diseases and risk of hematopoietic malignancies in a cohort of postmenopausal women: a report from the Iowa Women's Health Study. Cancer Epidemiology, Biomarkers & Prevention. 2014;23(9):1903-12.

LUNG CANCER CARE OUTCOMES/SURVEILLANCE CONSORTIUM

Gould MK, Wagner TH, Schultz EM, Xu X, Ghaus SJ, Provenzale D, et al. Facility-level analysis of PET scanning for staging among US veterans with non-small cell lung cancer. Chest. 2014;145(4):839-47.

Liu PH, Landrum MB, Weeks JC, Huskamp HA, Kahn KL, He Y, et al. Physicians' propensity to discuss prognosis is associated with patients' awareness of prognosis for metastatic cancers. Journal of Palliative Medicine. 2014;17(6):673-82.

Wong AC, Stock S, Schrag D, Kahn KL, Salz T, Charlton ME, et al. Physicians' Beliefs About the

Benefits and Risks of Adjuvant Therapies for Stage II and Stage III Colorectal Cancer. Journal of Oncology Practice. 2014;10(5):e360-7.

NON-HODGKIN LYMPHOMA (NHL) CASE-CONTROL STUDY

Bracci PM, Benavente Y, Turner JJ, Paltiel O, Slager SL, Vajdic CM, et al. Medical history, lifestyle, family history, and occupational risk factors for marginal zone lymphoma: the InterLymph Non-Hodgkin Lymphoma Subtypes Project. Journal of the National Cancer Institute Monograph. 2014;2014(48):52-65.

Cerhan JR, Kricker A, Paltiel O, Flowers CR, Wang SS, Monnereau A, et al. Medical history, lifestyle, family history, and occupational risk factors for diffuse large B-cell lymphoma: the InterLymph Non-Hodgkin Lymphoma Subtypes Project. Journal of the National Cancer Institute Monograph. 2014;2014(48):15-25.

Linet MS, Vajdic CM, Morton LM, de Roos AJ, Skibola CF, Boffetta P, et al. Medical history, lifestyle, family history, and occupational risk factors for follicular lymphoma: the InterLymph Non-Hodgkin Lymphoma Subtypes Project. Journal of the National Cancer Institute Monograph. 2014;2014(48):26-40.

Morton LM, Sampson JN, Cerhan JR, Turner JJ, Vajdic CM, Wang SS, et al. Rationale and Design of the International Lymphoma Epidemiology Consortium (InterLymph) Non-Hodgkin Lymphoma Subtypes Project. Journal of the National Cancer Institute Monograph. 2014;2014(48):1-14.

Morton LM, Slager SL, Cerhan JR, Wang SS, Vajdic CM, Skibola CF, et al. Etiologic heterogeneity among non-Hodgkin lymphoma subtypes: the InterLymph Non-Hodgkin Lymphoma Subtypes Project. Journal of the National Cancer Institute Monograph. 2014;2014(48):130-44.

Slager SL, Benavente Y, Blair A, Vermeulen R, Cerhan JR, Costantini AS, et al. Medical history, lifestyle, family history, and occupational risk factors for chronic lymphocytic leukemia/small lymphocytic lymphoma: the InterLymph Non-Hodgkin Lymphoma Subtypes Project. Journal of the National Cancer Institute Monograph. 2014;2014(48):41-51.

SECOND CANCER STUDIES INCLUDING THE WECARE STUDY

Antoniou AC, Casadei S, Heikkinen T, Barrowdale D, Pylkas K, Roberts J, et al. Breast-cancer risk in families with mutations in PALB2. New England Journal of Medicine. 2014;371(6):497-506.

Dores GM, Curtis RE, van Leeuwen FE, Stovall M, Hall P, Lynch CF, et al. Pancreatic cancer risk after treatment of Hodgkin lymphoma. Annals of Oncology. 2014;25(10):2073-9.

Morton LM, Gilbert ES, Stovall M, van Leeuwen FE, Dores GM, Lynch CF, et al. Risk of esophageal cancer following radiotherapy for Hodgkin lymphoma. Haematologica. 2014;99(10):e193-6.

STUDIES INVOLVING TISSUE

Altekruse SF, Rosenfeld GE, Carrick DM, Pressman EJ, Schully SD, Mechanic LE, et al. SEER Cancer Registry Biospecimen Research: Yesterday and Tomorrow. Cancer Epidemiology, Biomarkers & Prevention. 2014;23(12):2681-7.

Hernandez BY, Goodman MT, Lynch CF, Cozen W, Unger ER, Steinau M, et al. Human papillomavirus prevalence in invasive laryngeal cancer in the United States. PLoS One. 2014;9(12):e115931.

Hernandez BY, Goodman MT, Unger ER, Steinau M, Powers A, Lynch CF, et al. Human papillomavirus genotype prevalence in invasive penile cancers from a registry-based United States population. Frontiers in Oncology. 2014;4:9.

Hopenhayn C, Christian A, Christian WJ, Watson M, Unger ER, Lynch CF, et al. Prevalence of human papillomavirus types in invasive cervical cancers from 7 US cancer registries before vaccine introduction. Journal of Lower Genital Tract Disease. 2014;18(2):182-9.

Jia J, Bosley AD, Thompson A, Hoskins JW, Cheuk A, Collins I, et al. CLPTM1L Promotes Growth and Enhances Aneuploidy in Pancreatic Cancer Cells. Cancer Research. 2014;74(10):2785-95.

Mbulaiteye SM, Pullarkat ST, Nathwani BN, Weiss LM, Nagesh R, Emmanuel B, et al. Epstein-Barr virus patterns in US Burkitt lymphoma tumors from the SEER residual tissue repository during 1979-2009. APMIS : Acta Pathologica, Microbiologica, et Immunologica Scandinavica. 2014;122(1):5-15.

Sinno AK, Saraiya M, Thompson TD, Hernandez BY, Goodman MT, Steinau M, et al. Human papillomavirus genotype prevalence in invasive vaginal cancer from a registry-based population. Obstetrics and Gynecology. 2014;123(4):817-21.

Steinau M, Saraiya M, Goodman MT, Peters ES, Watson M, Cleveland JL, et al. Human Papillomavirus Prevalence in Oropharyngeal Cancer before Vaccine Introduction, United States. Emerging Infectious Diseases. 2014;20(5):822-8.

Tillmans LS, Vierkant RA, Wang AH, Jewel Samadder N, Lynch CF, Anderson KE, et al. Associations between Cigarette Smoking, Hormone Therapy, and Folate Intake with Incident Colorectal Cancer by TP53 Protein Expression Level in a Population-Based

Cohort of Older Women. Cancer Epidemiology, Biomarkers & Prevention. 2014;23(2):350-5.

TRANSPLANT CANCER MATCH STUDY

Engels EA, Castenson D, Pfeiffer RM, Kahn A, Pawlish K, Goodman MT, et al. Cancers among US organ donors: a comparison of transplant and cancer registry diagnoses. American Journal of Transplantation. 2014;14(6): 1376-82.

Gibson TM, Engels EA, Clarke CA, Lynch CF, Weisenburger DD, Morton LM. Risk of diffuse large B-cell lymphoma after solid organ transplantation in the United States. American Journal of Hematology. 2014;89(7):714-20.

Koshiol J, Pawlish K, Goodman MT, McGlynn KA, Engels EA. Risk of hepatobiliary cancer after solid organ transplant in the United States. Clinical Gastroenterology and Hepatology. 2014;12(9): 1541-9.e3.

Morton LM, Gibson TM, Clarke CA, Lynch CF, Anderson LA, Pfeiffer R, et al. Risk of myeloid neoplasms after solid organ transplantation. Leukemia. 2014;28(12):2317-23.

Morton LM, Gibson TM, Clarke CA, Lynch CF, Weisenburger DD, Engels EA. Hepatitis B or C virus infection and risk of non-Hodgkin lymphoma among solid organ transplant recipients. Haematologica. 2014;99(5):70-3.

Wetmore JB, Calvet JP, Yu AS, Lynch CF, Wang CJ, Kasiske BL, et al. Polycystic kidney disease and cancer after renal transplantation. Journal of American Society of Nephrology. 2014;25(10):2335-41.

OTHER

Banegas MP, Harlan LC, Mann B, Yabroff KR. Renal cell cancer: a shift in approaches for treatment of advanced disease in the United States. Journal of the National Comprehensive Cancer Network. 2014;12(9):1271-9.

Bedford RL, Lourens SG, Lynch CF, Smith BJ, Field RW. Utility of death certificate data in predicting cancer incidence. American Journal of Industrial Medicine. 2014;57(2):153-62.

Charlton ME, Adamo MP, Sun L, Deorah S. Bladder cancer collaborative stage variables and their data quality, usage, and clinical implications: A review of SEER data, 2004-2010. Cancer. 2014;120 Suppl 23:3815-25.

Charlton ME, Mengeling MA, Halfdanarson TR, Makki NM, Malhotra A, Klutts JS, et al. Evaluation of a home-based colorectal cancer screening intervention in a rural state. Journal of Rural Health. 2014;30(3):322-32.

Chen VW, Hsieh MC, Charlton ME, Ruiz BA, Karlitz J, Altekruse SF, et al. Analysis of stage and clinical/ prognostic factors for colon and rectal cancer from SEER registries: AJCC and collaborative stage data collection system. Cancer. 2014;120 Suppl 23:3793-806.

Coleman MP. Cancer survival: global surveillance will stimulate health policy and improve equity. Lancet. 2014;383(9916):564-73.

Doria-Rose VP, Harlan LC, Stevens J, Little RF. Treatment of de novo acute myeloid leukemia in the United States: a report from the Patterns of Care program. Leukemia Lymphoma. 2014;55(11):2549-55.

Duchman KR, Lynch CF, Buckwalter JA, Miller BJ. Estimated Cause-specific Survival Continues to Improve Over Time in Patients With Chondrosarcoma. Clinical Orthopaedics and Related Research. 2014;472(8):2516-25.

Malhotra A, Vaughan-Sarrazin M, Charlton ME, Rosenthal GE. Comparison of colorectal cancer screening in veterans based on the location of primary care clinic. Journal of Primary Care & Community Health. 2014;5(1):24-9.

Nielsen M, Vachon CM, Scott CG, Chernoff K, Karemore G, Karssemeijer N, et al. Mammographic texture resemblance generalizes as an independent risk factor for breast cancer. Breast Cancer Research. 2014;16(2):R37.

Parsons HM, Harlan LC, Stevens JL, Ullmann CD. Treatment of small cell lung cancer in academic and community settings: factors associated with receiving standard therapy and survival. Cancer Journal. 2014;20(2):97-104.

Schlichting JA, Mengeling MA, Makki NM, Malhotra A, Halfdanarson TR, Klutts JS, et al. Increasing colorectal cancer screening in an overdue population: participation and cost impacts of adding telephone calls to a FIT mailing program. Journal of Community Health. 2014;39(2):239-47.

Sperry SM, Charlton ME, Pagedar NA. Association of Sentinel Lymph Node Biopsy With Survival for Head and Neck Melanoma: Survival Analysis Using the SEER Database. JAMA Otolaryngology-- Head & Neck Surgery. 2014;140(12):1101-9.

Ward MM, Ullrich F, Matthews K, Rushton G, Tracy R, Bajorin DF, et al. Access to chemotherapy services by availability of local and visiting oncologists. Journal of Oncology Practice. 2014;10(1):26-31.

Ward MM, Ullrich F, Matthews K, Rushton G, Tracy R, Goldstein MA, et al. Where do patients with cancer in iowa receive radiation therapy? Journal of Oncology Practice. 2014;10(1):20-5.

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Special thanks to the staff of the State Health Registry of Iowa. We appreciate the generous assistance of physicians and other health care personnel serving Iowans.

This project has been funded in whole or in part with Federal funds from the National Cancer Institute, National Institutes of Health, Department of Health and Human Services, under Contract No. HHSN261201000032C.

Published February 2015